

WHAT IS CLAIMED IS:

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1. A semiconductor laser device with a spot-size converter, comprising at least:

a semiconductor laser region emitting light from an end facet thereof; and

a light waveguide region,

wherein the semiconductor laser region and the light waveguide region are integrated on a semiconductor substrate in a horizontal direction; and

a semiconductor layer is buried in a junction region between the semiconductor laser region and the light waveguide region.

2. A semiconductor laser device with a spot-size converter according to claim 1, wherein the refractive index of the semiconductor layer is substantially uniform.

3. A semiconductor laser device with a spot-size converter according to claim 1, wherein the refractive index of the semiconductor layer varies in a layer direction continuously or in a stepwise manner.

4. A semiconductor laser device with a spot-size converter

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a semiconductor laser region emitting light from
an end facet thereof; and

a light waveguide region,
wherein the semiconductor laser region and the light
waveguide region are integrated on a semiconductor
substrate in a horizontal direction; and

a dielectric layer is buried in a junction region
between the semiconductor laser region and the light
waveguide region.

8. A semiconductor laser device with a spot-size converter,
comprising at least:

a semiconductor laser region emitting light from
an end facet thereof; and

a semiconductor layer,
wherein the semiconductor laser region and the
semiconductor layer are integrated on a semiconductor
substrate in a horizontal direction; and

the refractive index of the semiconductor layer
varies in a layer direction continuously or in a stepwise
manner.

9. A semiconductor laser device with a spot-size converter
according to claim 8, wherein a region having the highest
refractive index of the semiconductor layer is registered
with a substantially central portion of a profile of light

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emitted from the semiconductor laser region.

10. A semiconductor laser device with a spot-size converter according to claim 8, wherein a second semiconductor layer is provided between the semiconductor layer and the semiconductor laser region, the refractive index of the second semiconductor layer being substantially uniform.

11. A semiconductor laser device with a spot-size converter according to claim 8, wherein a dielectric layer is provided between the semiconductor layer and the semiconductor laser region.

12. A method for fabricating the semiconductor laser device with a spot-size converter of claim 1 comprising at least a semiconductor laser region emitting light from an end facet thereof and a light waveguide region wherein the semiconductor laser region and the light waveguide region are integrated on a semiconductor substrate in a horizontal direction,

the method comprising the steps of:

forming a first semiconductor multilayer functioning as the semiconductor laser region on the

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substrate;

removing part of the first semiconductor multilayer by etching to have a substantially vertical cross-section thereof;

forming a second semiconductor multilayer functioning as the light waveguide region in the etched region;

removing a region including an interface between a light emitting end facet of the semiconductor laser region and a light incident surface of the light waveguide region by etching to have a substantially vertical cross-section thereof; and

forming a semiconductor layer in the etched region between the semiconductor laser region and the light waveguide region.

13. A method for fabricating the semiconductor laser device with a spot-size converter of claim 8 comprising at least a semiconductor laser region emitting light from an end facet thereof and a semiconductor layer wherein the semiconductor laser region and the semiconductor layer are integrated on a semiconductor substrate in a horizontal direction,

the method comprising the steps of:

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forming a semiconductor multilayer functioning as the semiconductor laser region on the semiconductor substrate;

removing part of the semiconductor multilayer by etching to have a substantially vertical cross-section thereof; and

forming the semiconductor layer in the etched region.

14. A method for fabricating a semiconductor laser device with a spot-size converter according to claim 13, wherein a dielectric layer is formed on a side of the etched region before formation of the semiconductor layer.

15. A method for fabricating the semiconductor laser device with a spot-size converter of claim 7 comprising at least a semiconductor laser region emitting light from an end facet thereof and a light waveguide region wherein the semiconductor laser region and the light waveguide region are integrated on a semiconductor substrate in a horizontal direction,

the method comprising the steps of:

forming a first semiconductor multilayer functioning as the semiconductor laser region on the

substrate;

removing part of the first semiconductor multilayer by etching to have a substantially vertical cross-section thereof;

forming a dielectric layer on a side of the etched region; and

forming a second semiconductor multilayer functioning as the light waveguide region in the etched region.

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